3/6/75

Environmental Chemistry Evaluation for Diquat dibromide (6,7-dihydrodipyrido (1,2-2: 2', 1'-C) pyrazinedium dibromide

PP No. 1F-1101,
Reg. File No. 239-1663

Submitted by Chevron Chemical Co., Ltr. 2/21/74

1. Recommendation

1.1 RL registration

1.2 The following data are needed:

1.2.1 Accumulation study on catfish. The following protocol is recommended to obtain the data:

Protocol for Fish Accumulation Study on Catfish (using radiolabeled material)

a. A sandy loam soil is to be treated in such a manner that catfish would be exposed to 0.01 ppm and 1.0 ppm if practical. The pesticide is to be aged in the soil for 30 days before exposure, and kept under water for aquatic uses.

b. Catfish are to be exposed to treated soil for 30 days. If a plateau has not been reached then exposure should be extended for an additional 30 days.

c. The rate of residue dissipation is to be determined by placing the catfish in pesticide-free environment at the end of the exposure time.

d. Residue determinations of edible tissue are needed throughout the study. When a plateau level is reached or at an interval of high residues in the edible tissue, determination for polar and nonpolar extractables is needed along with determination of tissue-incorporated residues.

e. Determination for residues in viscera should be made at several intervals to correspond with tissue sampling.

f. Accumulation factors should be recorded.

g. Determination for the amount of residue present in water and soil should be made at each fish sampling.

h. Identification of the residues in fish are needed at plateau level, at highest accumulation level and about the 14th day during withdrawal.

All radiolabeled studies should be supported with the following information:

a. Sample calculations

b. Counting efficiencies

c. Counting time

d. Background levels

e. Probable error with scintillation techniques.

2. Introduction

2.1 See Environmental Chemistry Review of 4/9/74

2.2 Applicant proposes establishment of a tolerance for residues of diquat in potable water at 0.01 part per million.

2.3 There are registered aquatic uses for diquat.

3. Direction For Use - Florida Only

3.1 Submerged aquatic weeds (infesting lakes, reservoirs, canals and ditches): Apply 1-2 gals (2-4 lbs.) diquat/per surface acre by surface spray, subsurface injection or bottom placement.

3.2 Floating weeds (except duckweed): Apply 1/2 - 3/4 gals (1 to 1 1/2 lbs) diquat in 150 to 200 gals of water/per surface acre.

3.3 Marginal weeds: Apply 1 gal (2 lbs.) diquat in 100 gals water/per surface acre.

4. Discussion of Data

4.1 Dissipation of diquat in water and hydrosoils.

Letter report from the Department of HEW, Regional Office, Region IV to the U.S. Army Engineer District, Mobile - Vol. 1, Section C, Ref 4.

Persistence of paraquat and diquat in water and hydrosoil was evaluated by treating two ponds with 2.5 ppm (cation content) of the subject herbicides. After approximately two months, the ponds were retreated at the same dosage rates reversing the applications (deeper pond; paraquat - shallow pond; diquat). Water and hydrosoils were analyzed for residues. Non detectable residues (<0.01 ppm) of diquat occurred between 7 and 14 days in the shallow pond and between 27 and 30 days in the deeper pond. Ponds' water was monitored for 85 days afte treatment for diquat and 118 days for paraquat.

Conclusions:

1. Flow rate of ponds were not submitted.

2. Hydrosoils were incompletely characterized; percent silt, sand, clay, organic matter and ion exchange capacity were not submitted.

3. Detectable residue of diquat persisted in water for 14 to 30 days (treated at 2.5 ppm).

4. No adsorbed diquat was recovered from hydrosoils; therefore, it is concluded that diquat at these low levels would not be released (desorbed into water).

4.2 Annual Report - Herbicides on Submersed Aquatic Weeds and Determination of Their Residues - Vol. 1, Section C, Reference 6.

Determination of herbicides in plants, water, soil and fish from treated pools were made on several compounds. Efforts were directed toward correlation of residue data with known changes that occurred within a treated pool.

Comments on some of the pertinent results obtained from the study are as follows:

1. Absorption and translocation studies with ^{14}C labeled diquat indicated that submersed aquatic weed (waterstargrass) accumulated ^{14}C possibly as diquat cation in appreciable amounts.

2. Soil residue studies indicated that only a small portion of the absorbed diquat may be recovered by the analytical methods used.

4.3 "Chemical Control of Elodea densa Planch and Other Submersed Aquatic Plants as Influenced by Several Environmental Factors" - Vol. 1, Sec. C, Ref. 9.

Several environmental chemistry questions concerning persistence of diquat in water, hydrosoil and weeds were answered by cited references in this report.

1. Decay of treated algae and vascular plants eventually released more diquat cations for adsorption by the hydrosoil.

2. In studies by Gilderhus, 1.0 ppm w of diquat was applied to infestion of E. canadensis. Ten days after treatment, 0.16 and 0.13 ppm w diquat was detected in the respective ponds. No diquat could be measured at the next sampling date, 30 days after treatment. Levels of diquat in the soil were 6.0 and 10.0 ppm at 24 weeks after treatment.

3. Frank and Comes treated a Colorado farm pond with 0.62 ppmw diquat and observed dissipation rates of 0.49 ppmw at one day, 0.12 ppmw at day two, and 0.01 ppmw at day - 4. No diquat was detected at eight days. Levels of diquat in the hydrosoil had risen to 20 ppmw after 24 days. Diquat was still present in hydrosoil above 20 ppmw 160 days after treatment. It was concluded that the increase in diquat levels in the hydrosoil resulted from release of diquat from decomposing plants. Loss of diquat between time of adsorption by vascular hydrophyte and decay of these plants is unlikely since Smith, Funderburk, and Lawrence observed no degradation of diquat in plant tissue.

4. Diquat is dissipated from weed infested water faster than from weed free water; weeds adsorb diquat.

5. Diquat soil residues are persistent.

6. Due to its persistence in hydrosoil, diquat residue are biological unavailable once adsorb to hydrosoil. This agrees with the terrestial studies which indicate absence of activity and slow breakdown of diquat in soil moderate in clay and organic matter. This is supported by low levels of diquat.

Residue in Fish

4.3.1 "Effects of Single and Repeated Application of Diquat and Paraquat on Fathead Minnow and Channel Catfish Production in Plastic Pools" - Vol. 1, Section C, Reference No. 5.

Channel catfish and fathead minnow were exposed to application(of 1 ppm of diquat in the presence of aquatic weeds. The bottoms of the pools were covered with soil, but the catfish muddied the water to such an extent that the soil had to be covered with a layer of sand plus gravel. Fish food was added to each pool at a rate of 5 lb/a, 3 days per week. Observations for adverse effects of:

fish mortality;
oxygen depletion;
apparent kill of phytoplankton;
analyses of fish, water and soil for diquat;

were made after each application.

No fish kill was observed following treatment due to diquat or to depletion of dissolved oxygen caused by decomposition of weeds. There was no observation of "apparent" kill of the phytoplankton present in pools. However dead channel catfish were observed in al controls; mortality was said to be due to the depletion of dissolved oxygen in the controls caused by the excessive growth of weeds. No information on the concentration of diquat in water, soil and fish was submitted for this study.

Conclusions:

1. The study is incomplete for the following reasons:

   a. The residue data for diquat in fish, water and soil that is to be presented in P.G. Beasley's doctoral thesis were not submitted.

   b. This study was not designed to determine diquat residue accumulation in fish.

4.3.2 Abstract of 2 fish studies reported in Reference 9 - Vol. 1, Section C.

Levels of diquat found in fish exposed to diquat were measured. Bluegills exposed to one ppmω diquat in Wisconsin had body levels of 0.09 to 0.16 ppmω at 3 weeks, 0.03 to 0.06 ppmω at six weeks and no detectable diquat at 12 weeks after treatment.

In England rainbow trout exposed to one mg/L diquat for 11 days had a whole body level of 0.36 mg/kg diquat. No diquat could by detected in the muscle tissue.

Conclusions:

1. These studies are inadequate to determine the rate of accumulation and elimination of diquat residue in fish.

4.3.3 Diquat and paraquat: Residue in water and toxicity to fish and other aquatic fauna - Vol. 1, Sec. C, Ref. No. 13.

This report summarized most of the data available on diquat up to October 1964 on residues in water, fish, aquatic fauna, mud and weeds.

A. Residue in water.

Two field experiments:

(1) Samples of water were taken at intervals after treatment and analyzed for residues of diquat. The main conclusions were that in "static" water the original concentration (1.0 or 0.5 ppm diquat in the water) fell rapidly to about 0.1 ppm after 5 to 7 days in four of the trials and to below 0.03 ppm after 1, 4 and 7 days respectively in three other trials.

The results (data) from this study are reportedly in Protection Experimental Report No. PP/E/275 (May 1964) by G. L. Austin.

(2) Results from twelve trials in 1964 confirmed that diquat disappears rapidly from treated water within 5 to 7 days.

Results are summarized in the following table.

Initial Concentration	(Water) Mean Residue found (p.p.m.) after				
	3-6 hrs.	1 day	4 days	7 days	14 days
1 p.p.m. diquat	-	0.40(2 days)	0.22	0.09(9 days)	-
	-	0.81	0.16	0.10	0.005
	4.3*	1.28	0.15	0.12	0.03
	1.01	-	0.13	< 0.08	< 0.03
	-	0.02	0.10	< 0.003	-
	3.8	0.19	< 0.01	-	-
0.8 p.p.m. diquat	0.23-0.40	0.14	-	0.007	-
0.5 p.p.m. diquat	-	0.25	< 0.003	< 0.003	< 0.003
	0.35	-	0.05	< 0.003	< 0.003
	-	-	-	< 0.03	-
	0.51	0.11	< 0.03	< 0.03	< 0.03

* High initial concentration ascribed to dense blanket of weeds impeding downward movement of diquat.

The rapid loss of diquat from treated water is due to three principal causes:

1. Uptake by weeds.
2. Adsorption to suspended soil particles or mud.
3. Photochemical degradation.

B. Uptake by weeds.

2 ppm diquat was found in weed samples of Hippuris Vulgaris on day after treatment (0.5 ppm in the water).

In a laboratory experiment, 50 gram of two different weeds (watermilfoil and starwort) were immersed in a 1 ppm solution of diquat for two weeks. Analysis of the weeds at 2 weeks show 17.4, 19.1 ppm and 6.2, 7.0 ppm in watermilfoil and starwort weeds respectively.

C. Adsorption to suspended soil particles.

250 gm. of two different soil (a sand and a clay soil) were suspended in 2.5 liters of water and the suspensions left for one week to settle. Diquat was added to each to give 1 ppm in solution. Results of the experiment are reported in table below:

Adsorption from solution by suspended soil
Laboratory Experiment

Time after Treatment	Concentration of diquat in the water, p.p.m.	
	Jar containing clay soil	Jar containing sandy soil
24 hours	0.47	*
3 days	0.25	0.19
6 days	0.045	0.06
9 days	< 0.03	< 0.03

* precipitate caused interference during analysis

Over 50% of diquat was removed from water by suspended soil in 24 hours. In six days, less than 5% of diquat was in the water (over 95% was adsorbed by suspended particles of soils) - 0.05 ppm in water.

D. Photochemical degradation.

Aqueous solutions (1 ppm) of diquat was exposed to sunlight in the absence of weeds or suspended soil for five weeks. Diquat was completely degraded in 5 weeks. Similar solutions kept in the dark or subdued light were stable.

E. Residues of diquat and paraquat in fish and fresh water mussels.

1. Rainbow trout were exposed to 1 ppm diquat for 16 days. Fish were analyzed for diquat residues over the exposure period and at intervals following their return to fresh water. Results of the analyses are listed:

Residues of diquat in rainbow trout

Days in 1 p.p.m. diquat	Time in fresh water	Residue found 1 p.p.m. diquat
2	-	0.16
4	-	0.27
8	-	0.44
16	-	0.64
16	2 hours	0.42
16	4 days	0.32
16	16 days	N.D.*
16	32 days	-

* N.D. means less than 0.05 p.p.m.

Residues of diquat in fish in treated water increased with time. In fresh water, diquat residue in fish decreased with time. Over 50% of the fish died within 16 days in 1 ppm diquat solution. Residues were still increasing in live fish after 16 days of exposure

Conclusions:

1. The study is inadequate to determine residue accumulation in fish for the following reasons:

(a) The study was not continued long enough to reach plateau residue level in fish.

(b) Bioconcentration factor can not be calculated from data submitted.

(c) Residue decline rate in fish cannot be determined; fish were removed from treated water before plateau residue level was reached.

Several of the fish which died in the 1 ppm diquat solution were analyzed for diquat. Data are tabulated below. Also included in this table are results of analyzing fish kept in higher concentrations of diquat.

Residues of diquat found in fish which died

Immersion Details	Diquat found p.p.m.
6-15 days in 1 p.p.m. diquat	0.81
7-16 " " " " "	0.36
10-16 " " " " "	2.24
16-30 " " " " "	1.38
Until death in 5 p.p.m. diquat	3.1
" " " 10 " "	3.6
" " " 20 " "	3.1
" " " 80 " "	9.7

Three of the results from the dead fish analysis showed higher residues and one a lower residue than that found (0.64) in fish which survived 1 ppm diquat for 16 days. The petitioner concluded that the data are insufficient to draw any firm conclusions.

Several larger trout were kept in 1 ppm diquat solution for 7 days, followed by 2 hours in fresh water. The fish were sacrificed, weighed, dissected, and analyzed for residues.

Analysis of muscle and organs of rainbow trout exposed to 1 p.p.m. diquat solution for 7 days.

The weights of the tissue are composite samples from seven fish (approx. wt. 160 gm. each) and are fresh weights. About 15% of the tissue was lost during dissection.

(a) Diquat Expt.

Weight of tissue		Diquat found p.p.m.
Muscle	750 gm.	N.D. (< 0.025)
Gut	105 gm.	Interferences
Skin	105 gm.	0.12
Liver	21 gm.	N.D. (< 0.1)
Kidney	14 gm.	0.44
Gills	44 gm.	0.06
Spleen and heart	6 gm.	N.D. (< 0.25)

Residues of diquat found in larger trout were lower than those found in smaller trout. Residue of diquat in trout muscle was less than 0.025 ppm.

2. Residue of diquat in fresh water mussels.

Fresh water mussels were kept in 1 ppm solution of diquat for 16 days. Mussels were analyzed at intervals during the exposure period and after their return to fresh water. The following results were obtained.

Residues of diquat in mussels

Days in 1 ppm diquat	Time in fresh water	Diquat found (ppm)
2	2 hrs.	1.10
8	2 "	0.97
16	2 "	0.62, 2.34
16	2 days	0.73, 0.81
16	7-8 "	0.15, 1.40
16	21 "	0.35
16	35 "	0.11

Diquat residue in mussel showed a variable trend in residue accumulation; accumulated residue was lost slowly from mussels when returned to fresh water.

Relevant conclusions from this Report were summarized by the petitioner as follows: Diquat quickly disappear from treated water and their disappearance is due to uptake by weeds, adsorption by soil particles and photochemical degradation. The rate of disappearance is thus rather variable and depends upon movement of the water, density of weed, the presence of mud or suspended silt and sunlight. Generally diquat is below the 0.1 ppm level within 7 days and often within 4 days of treating water at the rates (0.5 - 1.0 ppm) used for weed control.

Diquat can be detected in fish kept in 1 ppm solutions of the herbicide. The residue are located in the gut, skin, gills, liver and kidney of the fish. None could be detected (< 0.025 ppm) in the meat. On transferring the fish to fresh water, diquat residue declined slowly.

Conclusion:

1. The fish studies in this report are inadequate to determine diquat residue accumulation in fish for one or more of the following reasons:

(a) The study was not continued long enough to reach

plateau residue levels in fish.

(b) Bioconcentration factor can not be calculated from data submitted.

(c) Residue decline rate in fish cannot be determined when fish are removed from treated water before plateau residue level in fish occurs.

4.3.4 The Fate of Diquat in Fish - Supplement to PP1F1101, Ref. 2.

Carp and trout were exposed for 1 week to an aqueous solution of ^{14}C - bridge labelled diquat solution at a concentration of 1 ppm. After exposure the fish were removed from the water and analyzed to determine the ^{14}C present. The distribution of ^{14}C (calculated as diquat) in the fish is given below:

Species	^{14}C Residue Calculated as Diquat (ppm)	
	Viscera	Flesh & Skin
Trout	0.123	0.009
Carp 1	0.474	0.019
2	0.216	-

Of the radioactivity present in viscera and flesh, approximatel 65% of activity could be accounted for as diquat.

Conclusions:

1. Data provided by this study is insufficient to determine residue accumulation in fish.

4.4 Biological Magnification of Pesticide Residues in Food Chain" - Vol. 1. Sec. C, Ref. 7.

Macek based bio magnification of a pesticide in the fish food chain on three conditions: persistence of the chemical in the physical environment, availability of the chemical to the organism, and persistence in the biological system (fish).

Available data indicated that diquat residue do not biomagnify in fish food chain.

4.5 Effects on Aquatic Fauna and Microflora.

4.5.1 "The Use of Diquat and Paraquat in Aquatic Weed Control, 1963" Vol. 1, Sec. C, Ref. No. 12.

Ponds with approximately two acre feet of water were stocked with bass, bluegill, and channel catfish. Pithophora (an aquatic weed) was present in all ponds. Diquat was applied at three rates: 0.50 ppm, 0.25 ppm and 0.125 ppm. Water temperatures at time of application were between 76° and 80° F. Observations were made on the response of plankton and bottom fauna to whole pond treatment. Plankton samples were collected from each pond before treatment and at weekly intervals for three weeks after treatment. Weight of plank present was calculated as milligram (dry weight) per cubic meter of water. Effects of diquat on bottom organism was tested in a small pond which contained no fish.

Results and Discussion

(a) Response of plankton.
There was a decrease in the weight of plankton in the treated ponds which followed the general pattern shown by the untreated controls. Diquat appeared to have no adverse effects on the weight of plankton present.

(b) Effect of diquat on bottom fauna.

Snails disappeared completely in the treated plot. It was assumed that the snails migrated from the treated side. After regrowth of vegetation, snails reappeared in treated side Other organisms considered in the study that diquat showed no apparent effect on were dragon flies, horseflies, aquatic worms, midge larvae and eligochaetes.

4.5.2 Abstracts of two studies reported in Reference 9, Vol. 1, Sec. C.

(a) Phytoplankton represent the produce organism in the first or foundation trophic level of the aquatic system. Field studies in Florida, Missouri and Holland indicated that applications of from 0.5 to 2 ppm w diquat did not effect phytoplankton population. In contrast a laboratory study conducted by USDI demonstrated that exposure to 1.0 ppm diquat for four hours reduced the production of a natural phytoplankton population 45%.

(b) Newman noted that in order to maintain dissolved oxygen levels above 8.0 ppm, diquat application to densely infested ponds should be spaced 12 days apart. Reduced dissolved

oxygen levels can occur when large quantities of vascular hydrophytes decay following herbicide application. Reduced dissolved oxygen in water can cause fish kills.

4.6 Diquat residue in rotated crops.

4.6.1 Rotated Crops Receiving Irrigation Water From Diquat Treated Ponds, Lakes and Streams.

Report 1. Overhead Irrigation With Water Containing Diquat - Crop Residue Data - Supplement to PP1F1101, Ref. 4.

Eleven different crops (peaches, summer squash, carrots, tomatoe blackberries, strawberries, oranges, mustard greens, sweetcorn, cowpeas and pasture grass) were overhead irrigated with water containing 0.01 and 0.05 ppm diquat. Irrigation was for approximately six hours to give 2 acre - inches of water. Samples were taken one day after irrigation for diquat residue analysis. The carrots were also sampled 7 and 14 days after irrigation.

Peaches, summer squash, carrots, tomatoes, blackberries, strawberries, oranges, mustard greens, sweetcorn ears and cowpeas beans contained 0.02 to less than 0.01 ppm diquat. They contained 0.04 ppm to less than 0.01 ppm after irrigation with water containing 0.05 ppm diquat.

Pasture grass and cowpeas hay contained 0.03 to 0.09 ppm after irrigation with water containing 0.01 ppm diquat. They contained 0.16 to 0.21 ppm after irrigation with water containing 0.05 ppm diquat.

Conclusion

1. We agree with the label restriction, Do not use treated water for overhead irrigation or livestock watering within 14 days after treatment, recommended by CB to which the petitioner has favorably replied in his revised label.

Ronald E. Ney, Jr.

Samuel F. Howard

3/6/75

TABLE A
GENERIC DATA REQUIREMENTS FOR DIQUAT DIBROMIDE

Data Requirement	Composition 1/	Use Pattern 2/	Does EPA Have Data To Satisfy This Requirement? (Yes, No or Partially)	Bibliographic Citation	Must Additional Data Be Submitted Under FIFRA Section 3(c)(2)(B)? 3/
§158.130 Environmental Fate					
DEGRADATION STUDIES-LAB:					
161-1 - Hydrolysis	TGAI or PAIRA	A, B, D, F, H	yes	Upton et al (No MRID)	No
Photodegradation					
161-2 - In water	TGAI or PAIRA	A, B, D, F, H	no	—	yes
161-3 - On soil	TGAI or PAIRA	A	no	—	yes
161-4 - In Air	TGAI or PAIRA	A	no	—	no 4/
METABOLISM STUDIES-LAB:					
162-1 - Aerobic Soil	TGAI or PAIRA	A, B F, H	no	—	yes
162-2 - Anaerobic Soil	TGAI or PAIRA	A	no	—	yes 5/
162-3 - Anaerobic Aquatic	TGAI or PAIRA	D	no	—	yes
162-4 - Aerobic Aquatic	TGAI or PAIRA	D	no	—	yes
MOBILITY STUDIES:					
163-1 - Leaching and Adsorption/Desorption	TGAI or PAIRA	A, B, D, F, H	no	—	yes
163-2 - Volatility (Lab)	TEP	A, F	no	—	yes
163-3 - Volatility (Field)	TEP	A F	no	—	yes

1/ Composition: TGAI = Technical grade of the active ingredient; PAIRA = Pure active ingredient, radiolabelled; TEP = Typical end-use product.
2/ The use patterns are coded as follows: A=Terrestrial, Food Crop; B=Terrestrial, Non-Food; C=Aquatic, Food Crop; D=Aquatic, Non-Food; E=Greenhouse, Food Crop; F=Greenhouse, Non-Food; G=Forestry; H=Domestic Outdoor; I=Indoor.
3/ Data must be submitted no later than _____.
5/ An acceptable anaerobic aquatic metabolism study will satisfy the requirement for an anerobic soil study.
6/ Conditional, depends upon dissipation rate in the field dissipation study.
7/ Conditional, required if significant residues of concern are found in the confined study
4/ Not required due to the apparent low volatility of diquat dibromide

TABLE A
GENERIC DATA REQUIREMENTS FOR DIQUAT DIBROMIDE

Data Requirement	Composition 1/	Use Pattern 2/	Does EPA Have Data To Satisfy This Requirement? (Yes, No or Partially)	Bibliographic Citation	Must Additional Data Be Submitted Under FIFRA Section 3(c)(2)(B)? 3/
§158.130 Environmental Fate (continued)					
DISSIPATION STUDIES-FIELD:					
164-1 - Soil	TEP	A, B, F, H	no	-	yes
164-2 - Aquatic (Sediment)	TEP	D	no	-	yes
164-3 - Forestry	TEP	—	no	—	no
164-4 - Combination and Tank Mixes		—	no	—	no
164-5 - Soil, Long-term	TEP	A	no	—	Conditional 6/
ACCUMULATION STUDIES:					
165-1 - Rotational Crops (Confined)	PAIRA	A	no	-	yes
165-2 - Rotational Crops (Field)	TEP	A	no	—	conditional 4/
165-3 - Irrigated Crops	TEP	D	no	-	yes
165-4 - In Fish	TGAI or PAIRA	A, B, D	no	-	yes
165-5 - In Aquatic Non-Target Organisms	TEP	D	no	—	yes

1/ Composition: TGAI = Technical grade of the active ingredient; PAIRA = Pure active ingredient, radiolabelled; TEP = Typical end-use product.
2/ The use patterns are coded as follows: A=Terrestrial, Food Crop; B=Terrestrial, Non-Food; C=Aquatic, Food Crop; D=Aquatic, Non-Food; E=Greenhouse, Food Crop; F=Greenhouse, Non-Food; G=Forestry; H=Domestic Outdoor; I=Indoor.
3/ Data must be submitted no later than _____.

5/

TABLE A
GENERIC DATA REQUIREMENTS FOR DIQUAT DIBROMIDE

Data Requirement	Composition 1/	Use 2/ Pattern	Does EPA Have Data to Satisfy This Requirement? (Yes, No or Partially)	Bibliographic Citation	Must Additional Data Be Submitted Under FIFRA Section 3(c)(2)(B)? 3/
§158.130 Environmental Fate (continued)				—	yes
Subpart K Re-entry					
132-1 Foliar Dissipation	TEP	A 8/	no	—	no
132-1 Soil Dissipation	TEP	N.A 9/	no	—	yes 10/
133-3 Dermal Exposure	TEP	A	no	—	yes 10/
133-4 Inhalation Exposure	TEP	A	no		

1/ Composition: TGAI = Technical grade of the active ingredient; PAIRA = Pure active ingredient, radiolabelled; TEP = Typical end-use product.
2/ The use patterns are coded as follows; A = Terrestrial, Food Crop; B = Terrestrial, Non-Food; C = Aquatic, Food Crop; D = Aquatic, Non-Food; E = Greenhouse, Food Crop; F = Greenhouse, Non-Food; G = Forestry; H = Domestic Outdoor; I = Indoor.
3/ Data must be submitted within time indicated under column from date of receipt of this Standard.

8/ An interim 24 hour reentry interval is required for terrestrial uses until foliar dissipation (decline curve) data are received, evaluated and accepted by the agency

9/ Not applicable

10/ Not required if acceptable foliar dissipation data are submitted